## GENERAL NOTES.

### BOTANY.

VOLVOX GLOBATOR.—Although this minute organism has long been a favorite object for observation under the microscope, its structure has only recently been fully worked out by Prof. F. Cohn, of Breslau. Its reproductive organs are now found to be of a highly complicated structure, indicating its proper position in a comparatively high class of Cryptogams, with a marked affinity, in some respects, to the Fucaceæ. It must, at all events, be placed in Sachs' class Oösporeæ.

The Volvox is a minute pale-green globule just visible to the naked eye, about one-fiftieth of an inch in diameter, rolling about rapidly in clear water, owing to the action of innumerable fine, transparent vibratile cilia with which the surface is studded. These cilia are arranged in pairs, each pair belonging to a separate peripheral corpuscle or cell, each of which contains a green protoplasm-body, a minute starch-granule, a reddish brown "eye-spot," and one or two contractile vacuoles, the cilia being borne at the narrow hyaline end. Each is surrounded by a gelatinous envelope, which is pierced by a number of canals, all lying nearly in one plane, and filled by green or colorless extensions of the protoplasmic interior. Since the canals of adjoining cells correspond, the corpuscles appear as if connected together by a network of fine reticulations. The outer gelatinous wall of each cell is also perforated by two pores, through which the two vibratile cilia project into the surrounding water. These cells have, as far as is known, no reproductive function. Besides these non-reproductive or sterile cells, each Volvox colony includes three kinds of reproductive cells, non-sexual, male and female. The non-sexual reproductive cells, or parthenogonidia, are similar in structure to the sterile cells, but two or three times their size, *i.e.*, from .006 to .009 mm. in diameter. They multiply by repeated bipartition, this process having been followed by Cohn until the original cell has divided into sixteen. The young colony is surrounded by a transparent membrane, which it at length breaks through, and carries on an independent existence within the cavity of the mother colony, each of its cells developing a pair of cilia; finally it escapes into the surrounding water. The usual number of parthenogonidia which thus develop into infant colonies within the mother-colony is eight. The sexual reproductive cells are very few in proportion to the sterile cells, and appear to be formed only in the autumn, and the two kinds, male and female, are found either in the same or in different colonies; and the sexual generation forms the close of a larger or shorter series of non-sexual generations. The female cells or gynogonidia are at first undistinguishable from the parthenogonidia, but are much more numerous, and very early form chlorophyll. They

have, at first, a frothy appearance from the formation of vacuoles, but afterwards appear to be filled with protoplasm. They soon become flask-shaped, their narrow end touching the periphery of the sphere, and the larger end hanging free into the cavity. When ready for impregnation they round themselves off into a spherical form, and may then be designated oöspheres, each being enveloped in a gelatinous membrane or oögonium. The androgonidia, or male cells, also contain chlorophyll; they divide but only in two directions, thus developing not into a sphere but into a plate of cells. They ultimately resolve themselves into a bundle of naked primordial cells, each consisting of an elongated body in which the chlorophyll has been transformed into a reddish-yellow pigment, and of a long colorless beak, to the base of which are attached two very long vibratile cilia, and where also is a red corpuscle or "eye-spot." The whole androgonidium may now be regarded as an antheridium enclosed in a gelationous envelope, each of the naked protoplasmic bodies being a mobile antherozoid or spermatozoid. The movements of the vibratile cilia eventually cause the antheridium to break up, the separate antherozoids setting up a rapid independent motion within the gelatinous envelope of the antheridium, which they ultimately break through, and then move about rapidly in all directions within the cavity of the mother-colony. They assemble in large numbers round the oögonia, and some of them finally penetrate through the gelatinous envelope of the latter, and coalesce with their protoplasmic contents or oöspheres. The fertilized oösphere is now an oöspore, and develops a new cell-wall, the epispore, which is at first smooth, but afterwards covered with conical elevations, giving a section of it a stellate appearance. A second perfectly smooth membrane, the endospore, is subsequently found within the first. The chlorophyll gradually disappears, and is replaced by an orange-red pigment dissolved in oil, so that the mature oöspore, while still enclosed within the mother-colony, is of a light-red color, causing the red tinge which Volvox often presents, even to the naked eye, at certain periods of the year. Soon after the oöspores reach maturity, the mother-colony breaks up, single cells escaping from the combination, and swimming about freely in the water; their further history is unknown. The oöspores fall to the bottom and there hibernate. Their further development has only been observed by Cienkowski, who states that the contents of each spore break up into eight spheres which ultimately break out.

Full details of these interesting processes, with admirable illustrations, will be found in Cohn's Beiträge zur Biologie der Pflanzen, Vol. i, Heft 3.—*Alfred W. Bennett.*

A Double-flowered Cypripedium spectabile.—In describing this flower it is viewed as it hangs on the stem in its natural position, having a right and a left side, the observer facing the open flower.

The parts in their natural place are the outer sac, the lower sepal, the stigma and the two pollinia. The lower sepal is broader than is usual, the stigma deeply two-lobed and twice the ordinary width. The right-hand pollen-mass is doubled, the third one standing at the apex of the angle made by the two barren stamens. These stamens are of the ordinary size, and face each other at an angle of 80°. The upper part of the flower may be regarded as composed of two single flowers, together occupying about 240° of a circle, the lower sepal being the only part in the remaining space. There are a sepal and two petals on the upper left side, and the same on the upper right, each part of the usual size. The natural flower is the left one to which the outer sac belongs. Its right-hand petal is nearly vertical, where the upper sepal naturally stands. The left petal of the right-hand flower stands directly behind this, and has grown by one edge to the edge of the upper or involucral leaf, which in turn is grown by the remainder of the same margin to the ovary, so as to be adherent all the way from the base of the ovary to the top of the petal.

The ovary is enlarged, one-celled, with four parietal placentæ; some of the placentæ are uncommonly broad, and are probably doubled, though so closely connected as not to be distinguished. One sac is contained in the other, but entirely free, and readily drawn out. The inner sac belongs to the right-hand flower, its claw being a little to the left of that of the outer. Though contained in the outer, it is really larger when inflated, being crumpled as it is packed away. The flowers are large, the sacs being two inches long.

From the position of the parts, which were carefully compared with fresh specimens of the single flower, it is probable that this monstrosity arose from two buds, starting from the same point of the stem, and adhering by their inner faces, those parts only being doubled in reality, for which room for development was found, the doubling of the rest being disguised in the enlarged parts that represented them. Most of the specimens I have examined bear but two flowers, and almost always that number.

This flower was brought in a bouquet from some place in Indiana, the name of which I could not learn. It is found abundantly in the peat bogs and margin of sloughs in the pine barrens of Lake Co., Ind. I have since been told that it is not unusual to find these double flowered Lady's Slippers, though it is the first that has come under my observation, or that of any of my botanical friends to whom I have mentioned it.—*E. J. Hill.*

A New Variety of Campanula rotundifolia L.—While collecting plants in the northern part of Michigan the past summer, I discovered a form of this plant that I do not find mentioned. It differs from the ordinary forms in being densely pubescent, or hoary with short, reflexed hairs, at least on the lower part of the stem and leaves, some plants being smooth or somewhat so above.

Usually the flower alone is smooth. The stems are generally stout and clustered, from one to two and a half feet high. There are often from eighteen to twenty flowers on a stem. This abundance of flowers seems to characterize nearly all of my specimens of *C. rotundifolia* gathered along the shores of Little and Grand Traverse bays. In Gray's *Synoptical Flora*, our latest authority, the plant is said to be 1–9 flowered. Most of mine exceed this. One stem has thirty-two in different stages of growth. I propose for this variety the name *C. rotundifolia var. canescens*. It grows on sand hills at Indian river, near the outlet of Burnt lake, Sheboygan Co., Mich.—*E. J. Hill, Englewood, Ill.*

Mr. J. L. Bennett, of Providence, R. I., informs us that a form exactly similar to this, save in the abundant flowers, is found in Greenfield, Franklin Co., Mass.; the amount of canescence differs very much, even in the same plants, some stems being very nearly smooth, while others are quite hoary; different portions of the same stem also varying greatly.—*W. W. B.*

Extirpation of a Plant.—Though attributed to Southern Florida, where it is still common, the coontie (*Zamia integrifolia* Willd.) is found to extend as far north as Alachua, Bradford and adjoining counties of this State, and, at one time, I understand, was most abundant in the localities named. But of late it is comparatively rarely met with in this region, and in many wide ranges has totally disappeared. Where hogs are kept, and are allowed to roam at large, as is usually the case in Florida, the plant, I am informed, is soon extirpated, those animals ravenously devouring it, and I have traveled over many miles of this territory without meeting a single Zamia. Its stem is rich in starch, and from it is made the coarser description of Florida arrowroot. Hence its attraction for the hog. Any one who has seen, as I have, the manner in which this animal attacks and uproots so difficult a subject as the young saw-palmetto (*Sabal serrulata* R. and S.) can easily understand what short work it would make with the coontie. Belonging to the *Cycadaceæ*, its pinnate leaves and palm-like aspect give the *Zamia* a peculiarly ornamental and attractive appearance, and its vanishing from so wide a field is much to be regretted. As Florida becomes more thickly settled, the total extirpation of the plant, except in its more southern habitat, and where taken into cultivation, may prove to be a not unlikely event, from the cause mentioned, and also from its use by man in manufacturing starch and arrowroot.—*Henry Gillman, Waldo, Florida.*

The Structure and Affinities of Characeæ.—In recent numbers of the London *Journal of Botany*, Mr. A. W. Bennett and Prof. Caruel discuss this subject; both these botanists dissenting from Sachs's location of the *Characeæ* (in the fourth edition of his Jahrbuch der Botanik) among the *Carposporeæ*, a

class of Thallophytes. Mr. Bennett points out that not only do the *Characeæ* differ from Thallophytes in the most essential points of structure of that class, viz: in possessing a distinct axis and branches; they do not, either display the distinguishing characteristics of the *Carposporeæ*, viz: the formation, as the result of the impregnation of the female organ, of a sporocarp consisting of two essentially different parts, a fertile part and an envelope or pericarp which is not derived directly from the female organ. Mr. Bennett also calls attention to the fact that the term "proembryo" has been misapplied by many writers to the structure which proceeds immediately from the germination of the spore of Chara, and which is rather a prothallium or a protovum; and again that the *Characeæ* are incorrectly described by some as displaying the phenomenon of alternation of generations. The term alternation of generations implies two distinct starting points in the life-history of the plant, impregnation and germination; the sexual generation consisting of the stage intermediate between germination and impregnation, the non-sexual generation, of the stage intermediate between impregnation and germination. In *Characeæ*, almost alone among Cryptogams, the oöspore or fertilized oösphere germinates immediately in the soil without the intervention of a non-sexual generation. Caruel, for reasons assigned in his new system of classification, to which we have already referred, insists on placing the *Characeæ* by themselves as a primary group of the vegetable kingdom, under the name *Schistogamæ*, intermediate between Phænerogams and vascular Cryptogams.—*A. W. Bennett.*

Botanical News.—In a short paper by Dr. Ewart, on the Life-history of *Bacterium termo* and Micrococcus, the author regards it provisionally as distinct from Bacterium. His observations on *Bacterium termo*, especially, with reference to the effects of desiccation, of different temperatures and of ebullition will be of value in future researches of like nature. Mr. Geddes and Dr. Ewart describe also in the Proceedings of the Royal Society the life-history of Spirillum, and they conclude that "the forms described by various authors as Vibrio are merely either (1) Zigzag dividing Bacillus; (2) slightly waved Bacillus; or (3) undeveloped Spirillum, and hence that Vibrio should no longer be used as a generic term." The *New Italian Botanical Journal* for July 30, contains Delpino's defence of his dichogamic doctrine, with a brief appendix by T. Caruel, the editor. In Trimen's *Journal of Botany*, for October, J. B. Balfour describes some points in the morphology of Halophila, and G. S. Boulger contributes an article on the placenta of *Primulaceæ*. The *Bulletin* of the Torrey Botanical Club, for September, contains a list of plants introduced with ballast and on made land in Jersey City; Lists of Long Island and Staten Island and Rhode Island plants are also given. Mr. Martindale contributes to the September number of the *Botanical*

*Gazette*, a notice of the occurrence of *Orobanche minor* in New Jersey. Dr. A. P. Garber writes in the October number of South Floridan ferns, while Mr. J. G. Lemmon writes in rather a gushing way of the big trees of California.

## ZOÖLOGY.[1]

BREEDING HABITS OF CORIXA. — In Bulletin No. 1 of the Illinois State Laboratory of Natural History, I called attention, three years ago, in a paper on the Crustacea of Illinois, to a breeding habit of Corixa, which seems to have escaped the notice of the entomologists; and as my note has also been generally overlooked by those most interested, I repeat the observation here, especially as it affords a very curious illustration of natural selection, unless I wholly misunderstand the matter.

In temporary ponds of this region, which fill up every spring and dry out in midsummer, *Corixa alternata* Say, is an abundant insect, and *Cambarus immunis* Hagen, is the commonest craw-fish. In seining some of these ponds, three years ago, in June and July, I noticed that the backs of many of the crawfishes were covered with a moss-like incrustation, which, upon examination proved to be the eggs of insects, stuck fast by one end as close together as they could be placed. Sometimes only a few would be found on a crawfish, and sometimes the upper surface would be nearly covered. They were just hatching when first observed, and it took but a little time to determine that they were unmistakable Corixas. Careful search of the water weeds and other submerged objects failed to discover other eggs, and I was led to conclude that the Corixa purposely selected this remarkable place for oviposition. Since then I have found these eggs also on the shells of pond molluscs, and on the carapace of *Cambarus acutus* Gir., another wide-spread and common crawfish.

I can account for so strange a habit only by supposing that it is a "provision of nature" to guard against the waste of eggs otherwise resulting from the drying up of the ponds. The crawfishes mentioned are distinctively aquatic species, and as one pond dries up they migrate to another, or to a neighboring stream, bearing on their hospitable backs, as the shepherd bore Œdipus from impending destruction, the hopes of the distressed water bugs. If this is a fixed habit of a species or variety, and not a local accident, it ought to be heard of elsewhere.—*S. A. Forbes.*

SNAKES AND COLD VICTUALS.—It is a popular notion that serpents never eat what has been killed by any agency except their own; and, though naturalists know this belief to be false, very few of the one hundred and thirty-two species of North American serpents have been proved by actual observation to have eaten any animal which they have not captured alive.

[1] The departments of Ornithology and Mammalogy are conducted by Dr. ELLIOTT COUES, U. S. A.